Data 101: Using CBM Data for Effective Decision Making

Dr. Tessie Rose

Session Agenda

- Welcome and Introductions
- Overview of Effective Data Decision Making
- Overview of Curriculum Based Measurement
- Interpreting CBM: Criterion-Referenced, Norm-Referenced, and Target Scores
- Interpreting CBM: School, Grade, Class, or Student Level Decisions
- Wrap-up

Upon completion of this training, participants will be able to:

- identify 5 ways to use CBM data for data based decision making;

- interpret CBM charts using norm-referenced, criterion-referenced, and target data; and

- select appropriate CBM data to address educational decisions at the school, grade, class, and student level.

Key Elements of Effective Data Decision Making

- Purposeful data collection and analysis

- Designated resources and other supports, such as time and an appropriate data management system; and

- Strategies for communicating about the process of data collection and use as well as the findings.

(www.mcrel.org)

1. Purposeful data collection & analysis

Benefits

- More efficient use of resources
- Increased buy-in and use of data by teachers
- Common message and focused activities

Includes

- Student decisions
- Program decisions (may require multiple year)

1. Purposeful data collection & analysis

Connecting Data Collection to Needs and Goals (Ex.)

- **Identified Need:**
  - Improvement in reading connected text in the elementary grades
- **Goal:**
  - By May 2010, 85% of 2nd grade students in each subgroup will perform at established levels in reading as measured by the Reading CBM.
- **Question:**
  - How effective are the reading intervention schedule and programs for struggling students?

2. Designated Resources & Supports

- Data Teams (provides multiple perspectives)

  – Plus established procedures and time

- Data collection tools and software

  – Plus supporting professional development

- Time, time, time!!

3. Effective Communication Strategies

- Communicating **purpose** of data collection AND **results**

- Occurs *throughout* the year
  - Following benchmark testing
  - Following reviews of progress monitoring data

- Dissemination with discussion is preferred
  - Encourage all teachers to about results, patterns, possible interpretations, and likely next steps.

Sample Progress Monitoring Chart
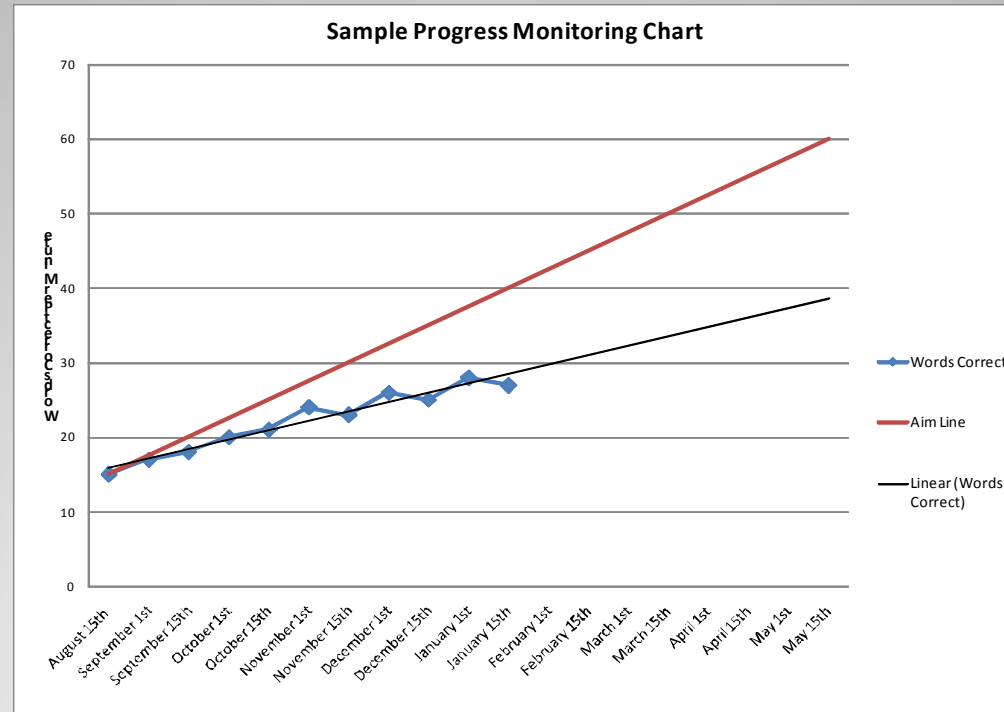
Overview of CBM

Types of Assessments

Type	When?	Why?
Summative	After	Assessment **of** Learning
Diagnostic	Before	Identify skill deficits
Formative	During	Assessment **for** Learning

Summative Assessments

- PURPOSE: Tells us what students *learned* over a period of time (past tense)
  - May tells us *what* to teach but not *how* to teach
- Administered **after** instruction
- Typically administered to **all** students
- Educational Decisions:
  - Accountability
  - Resource Allocation (reactive)
  - Skill Mastery Assessment

Summative Assessments

Examples:
- End of chapter tests
- High-stakes tests
- GRE, ACT, SAT, and GMAT
- Praxis Tests
- Final Exams

Diagnostic Assessment

- PURPOSE: Measures a student's current knowledge and skills for the purpose of identifying a suitable program of learning.

- Administered **before** instruction

- Typically administered to **some** students

- Educational Decisions:
  - What to Teach
  - Intervention Selection

Diagnostic Assessments

EXAMPLES:

- Qualitative Reading Inventory
- Diagnostic Reading Assessment
- Key Math
- Running Records with Error Analysis

Formative Assessments

- PURPOSE: Tells us how well students are responding to instruction

- Administered **during** instruction

- Typically administered to **all** students during benchmarking and **some** students for progress monitoring

Formative Assessments

Educational Decisions:

- Rates of improvement (progress monitoring)
- Identification of students who are nonresponsive to instruction or interventions (screening)
- Curriculum and instructional decisions
- Program evaluation
- Resource allocation (proactive)
- Comparison of instruction and interventions efficacy

Formative Assessments

- Formal and informal
- Mastery measures (e.g., intervention or curriculum dependent)
- General Outcome Measures (e.g., CBM)
  - AIMSweb – MAZE, R-CBM, Early Literacy, Early Numeracy
  - Dynamic Indicators of Basic Early Literacy Skills (DIBELS) – Early Literacy, Retell, and D-ORF
  - iSTEEP – Oral Reading Fluency

Summative or Formative?

Educational researcher Robert Stake used the following analogy to explain the difference between formative and summative assessment:

" When the cook tastes the soup, that's formative. When the guests taste the soup, that's summative."

(Scriven, 1991)

Common Formative Assessments

Mastery Measurement vs. General Outcome Measures

Most formative assessments for progress monitoring are mastery measurement.

Student progress monitoring is not mastery measurement.

Mastery Measurement

❖ Describes mastery of a series of short-term instructional objectives

❖ To implement Mastery Measurement, the teacher

– Determines a sensible instructional sequence for the school year

– Designs criterion-referenced testing procedures to match each step in that instructional sequence

Fourth Grade Math Computation Curriculum

1. Multidigit addition with regrouping
2. Multidigit subtraction with regrouping
3. Multiplication facts, factors to 9
4. Multiply 2-digit numbers by a 1-digit number
5. Multiply 2-digit numbers by a 2-digit number
6. Division facts, divisors to 9
7. Divide 2-digit numbers by a 1-digit number
8. Divide 3-digit numbers by a 1-digit number
9. Add/subtract simple fractions, like denominators
10. Add/subtract whole number and mixed number

Multidigit Addition Mastery Test

Name: _____   Date_____

Adding

36521	53429	84525	67842	57321
+63758	+63421	+75632	+53937	+46391

56382	36422	34824	32415	45321
+94742	+57529	+69426	+85439	+86274

Multidigit Addition Mastery Test

Fourth Grade Math Computation Curriculum

1. Multidigit addition with regrouping
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6. Division facts, divisors to 9
7. Divide 2-digit numbers by a 1-digit number
8. Divide 3-digit numbers by a 1-digit number
9. Add/subtract simple fractions, like denominators
10. Add/subtract whole number and mixed number

Multidigit Subtraction Mastery Test

Name:_____   Date_____

Subtracting

6521	5429	8455	6782	7321
- 375	- 634	- 756	- 937	- 391

5682	6422	3484	2415	4321
- 942	- 529	- 426	- 854	- 874

# Multidigit Subtraction Mastery Test
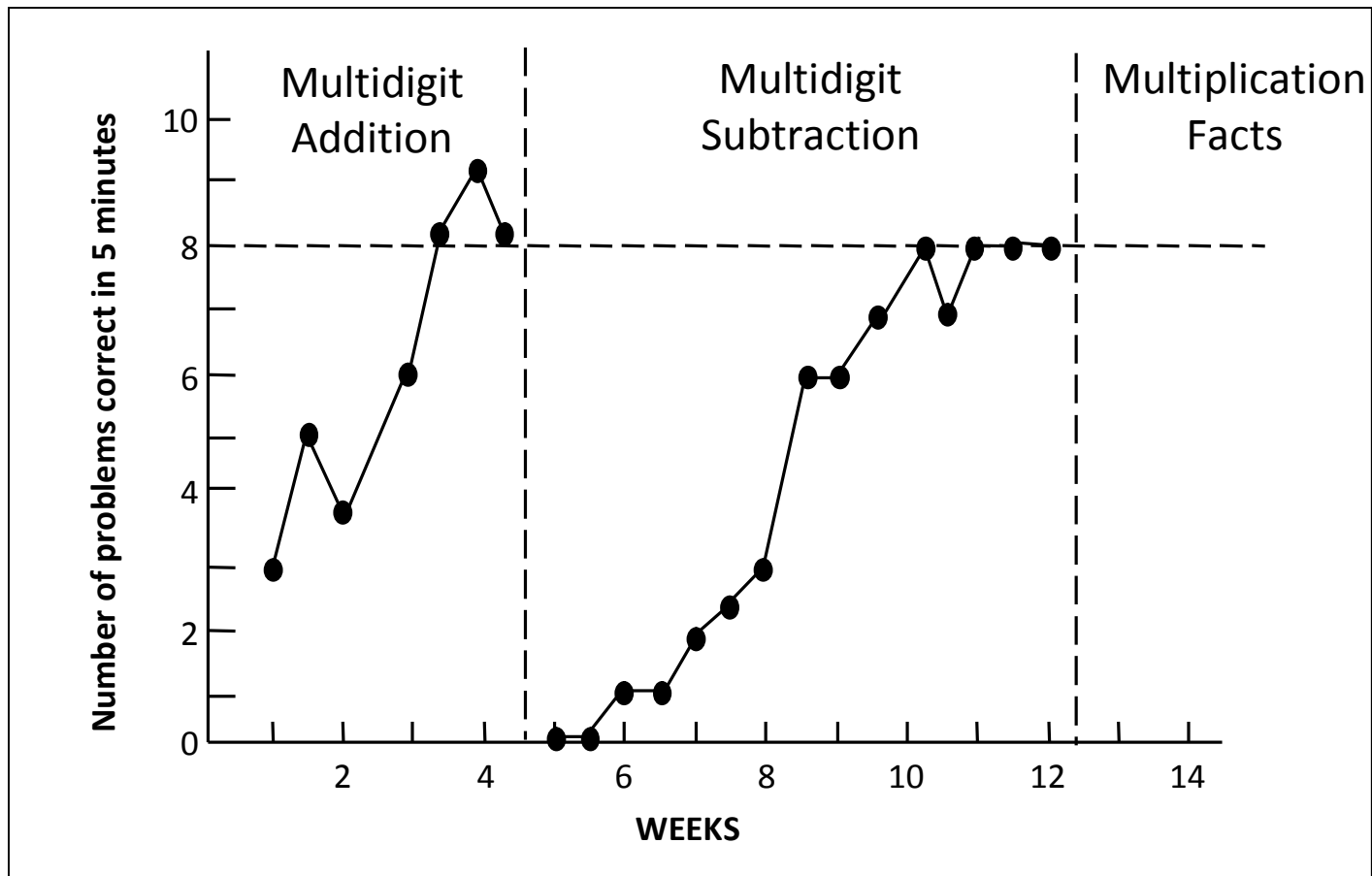
General Outcome Measures (GOM)

A comprehensive standards-based assessment system that:

• Describes individual children's growth and development over time (both "current status" and "rate of development")

• Is founded on growth referenced to valued outcomes

• Provides a decision-making model for designing and evaluating interventions

• Is used for individual children and for groups of children

General Outcome Measures from Other Fields

Medicine measures height, weight, temperature, and/or blood pressure.
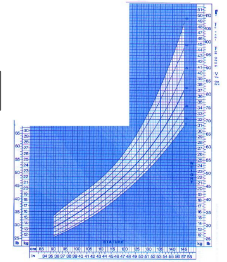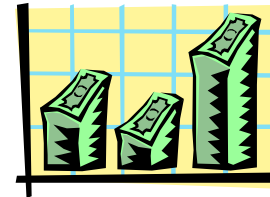
Federal Reserve Board measures the Consumer Price Index.

Wall Street measures the Dow-Jones Industrial Average.

Companies report earnings per share.

McDonald's measures how many hamburgers they sell.

AIMSweb Pearson
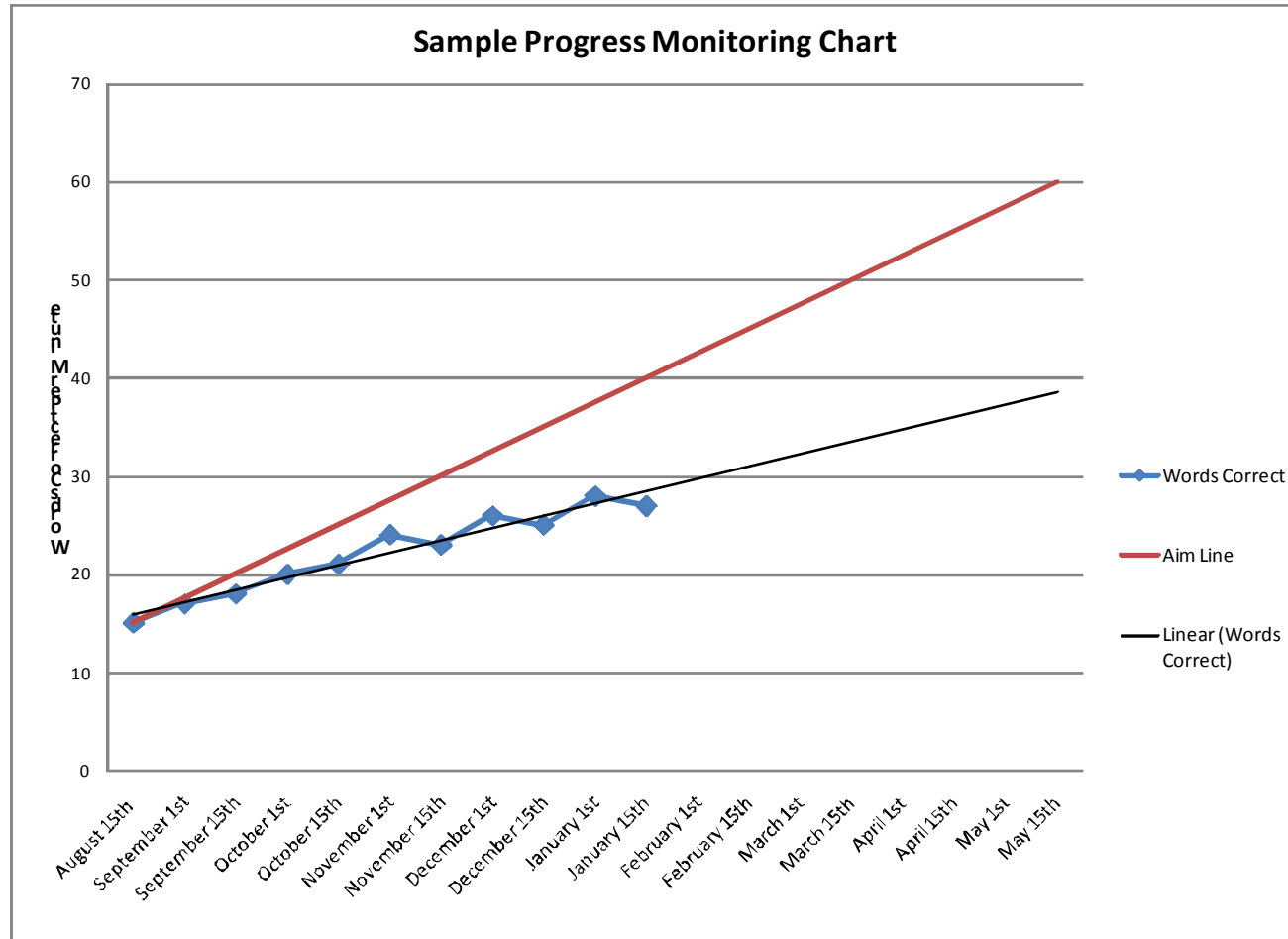
Common Characteristics of GOMs

Simple, accurate, and reasonably *inexpensive* in terms of time and materials.

Considered *so important* to doing business well that they are *routine*.

Are *collected* on an *ongoing* and *frequent basis*.

Shape or *inform* a variety of important decisions.

General Outcome Measures - CBM

Curriculum Based Measurement (CBM)

- AKA as a general outcome measures (GOMs) of a student's performance in either basic academic skills or content knowledge
- CBM tools available in core subject areas grades K-8
  - Can be used with older kids lacking basic skills
  - Can be used with students with low incidence disabilities

Curriculum-Based Measurement (CBM) *is an approach to measurement that is used to screen students or to monitor student progress in core academic areas. With CBM, teachers and schools can assess individual responsiveness to instruction, assess effectiveness of instruction and curriculum, and assess teacher and school accountability. CBM is a distinctive form of curriculum based assessment that includes unique properties: (1) alternate forms of equivalent difficulty and (2) standardized probes and administration procedures with well documented reliability and validity*

Adapted from National Center on Response to Intervention

Curriculum-Based Assessment

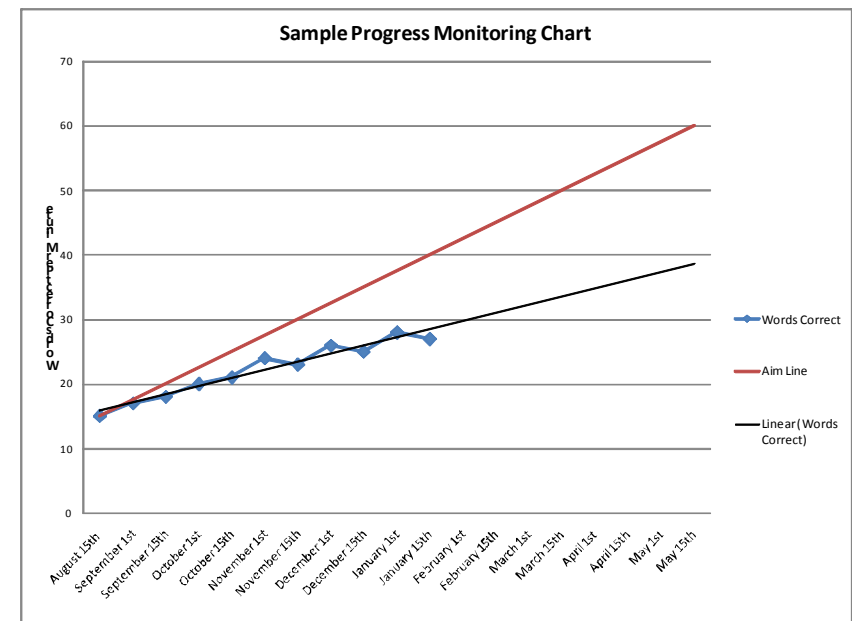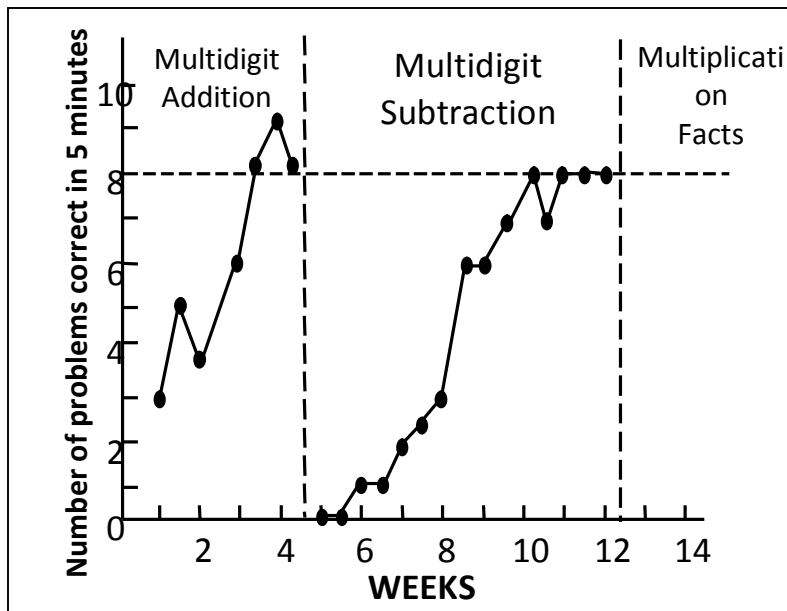- ❖ Curriculum-Based Assessment
  - – Measurement materials aligned with school curriculum
  - – Measurement is frequent
  - – Assessment information is used to formulate instructional decisions
- ❖ CBM is one type of curriculum-based assessment

Common Formative Assessments

Mastery Measurement vs. General Outcome Measures

Problems Associated With Mastery Measurement:

- ❖ Hierarchy of skills is logical, not empirical
- ❖ Assessment does not reflect maintenance or generalization
- ❖ Number of objectives mastered does not relate well to performance on criterion measures
- ❖ Measurement methods are designed by teachers, with unknown reliability and validity

Curriculum-Based Measurement (CBM) Was Designed to Address These Problems

- ❖ CBM makes no assumptions about instructional hierarchy for determining measurement

- ❖ CBM incorporates automatic tests of retention and generalization

Things to Always Remember About CBM

Are designed to serve as **"*indicators*"** of general reading achievement. R-CBM doesn't measure everything, but measures the ***important*** things.

Are ***Standardized tests*** to be given, scored, and interpreted in a ***standard way.***

Are ***researched*** with respect to psychometric properties to ensure accurate measures of learning.

Items to Remember (continued)

Are *Sensitive* to improvement in *Short Periods* of time.

Also tell us *how* students earned their scores (*Qualitative* Information).

Designed to be *as short as possible* to ensure its *"do ability."*

Are *linked to decision making* for promoting positive achievement and Problem-Solving.

Benefits of Using *CBM*

Are written to represent ***general curriculum*** or be "***curriculum independent***."

Allow decision making about reading growth, regardless of between-school, between-school-district, between-teacher differences in reading curriculum.

Are ***graded*** to be of ***equal*** difficulty.

Have numerous ***alternate forms*** for testing over time without practice effects.

Class Distribution by Scores and Percentile
Washington School District - Adams Elementary School
Grade 3 - (Ms. Adams) Winter 2005-2006
Reading - Curriculum Based Measurement

Name	Corrects	Errors	Accuracy	Performance Summary	Potential Instructional Action
Well Above Average >= 150 (90th %ile)					
Heitzig, Christopher	141			Above Average	Consider Need for Individualized Instruction
Above Average >= 131 (75th %ile)					
Halbert, Laura	127			Average	Continue Current Program
Ennis, Tori	126			Average	Continue Current Program
Ford, Keisha	118			Average	Continue Current Program
——— Target = 96 ———					
Gale, Megan	88			Average	Continue Current Program
Knaak, Katie	87			Average	Continue Current Program
Johnson, Dominic	84			Average	Continue Current Program
Average >= 79 (25th %ile)					
Manthey, Brooke	72			Below Average	Further Assess and Consider Individualizing Program
Jackson, Taylor	72			Below Average	Further Assess and Consider Individualizing Program
Below Average >= 72 (10th %ile)					
Meyer, Nicholas	51			Well Below Average	Begin Immediate Problem Solving

Interpreting Data: Norm-Referenced, Criterion-Referenced, and Target Scores

Interpreting Data

Three primary ways to interpret results of CBM
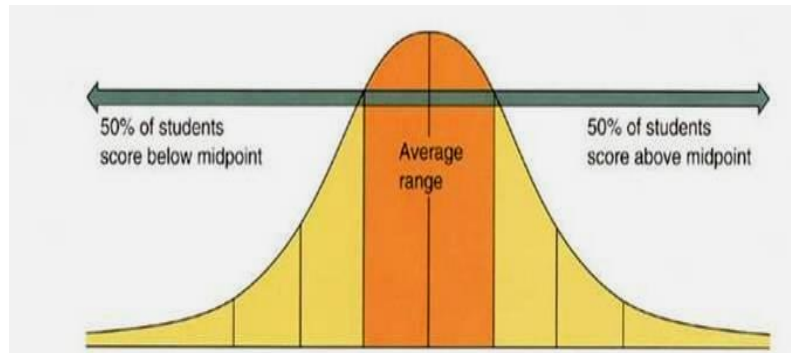
- Norm-Referenced

- Criterion Referenced

- Target Scores
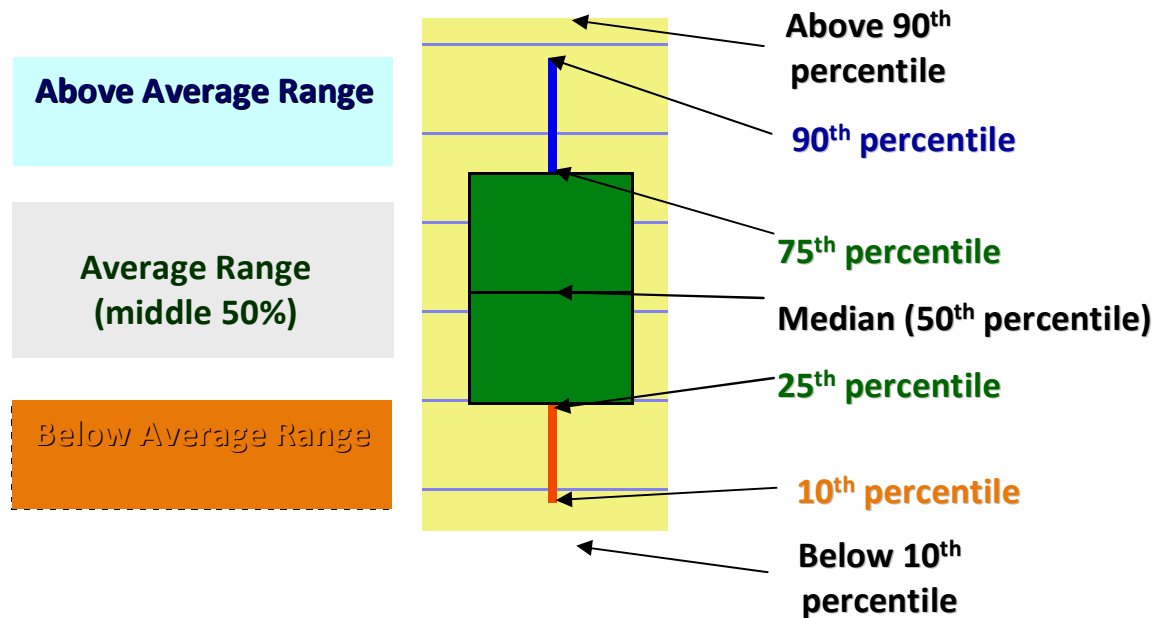
Norm-Referenced CBM

- Students are measured against those undertaking the test, NOT a defined criteria.

- Permits a fixed proportion of students to pass and fail.

  – This means that standards may vary from year to year, depending on the quality of the cohort;

- Effective way of comparing students.

Norm Reference: Box & Whiskers Graphs (AKA box plots):

Consider bell-curve. *Box plots are somewhat similar in shape and representation.*

50% of students score below midpoint

Average range

50% of students score above midpoint

Above Average Range

Average Range (middle 50%)

Below Average Range

Above 90th percentile

90th percentile

75th percentile

Median (50th percentile)

25th percentile

10th percentile

Below 10th percentile

Selecting Appropriate Norms: National

Benefits	Challenges
• Large norm sample • Established cut scores	• Inequities in school resources • Can lead to over/under identification

Selecting Appropriate Norms: Local

Benefits	Challenges
• Correlated with state testing outcomes • Comparisons within district/state	• Small Sample • Not initially available • Can lead to lower expectations

Criterion Referenced CBM

- Students are measured against defined (and objective) criteria.

- Criterion-referenced assessment is often, but not always, used to establish a person's competence (whether s/he can do something).

- Criteria typically do not vary from year to year (unless the criteria change).

Criterion Reference
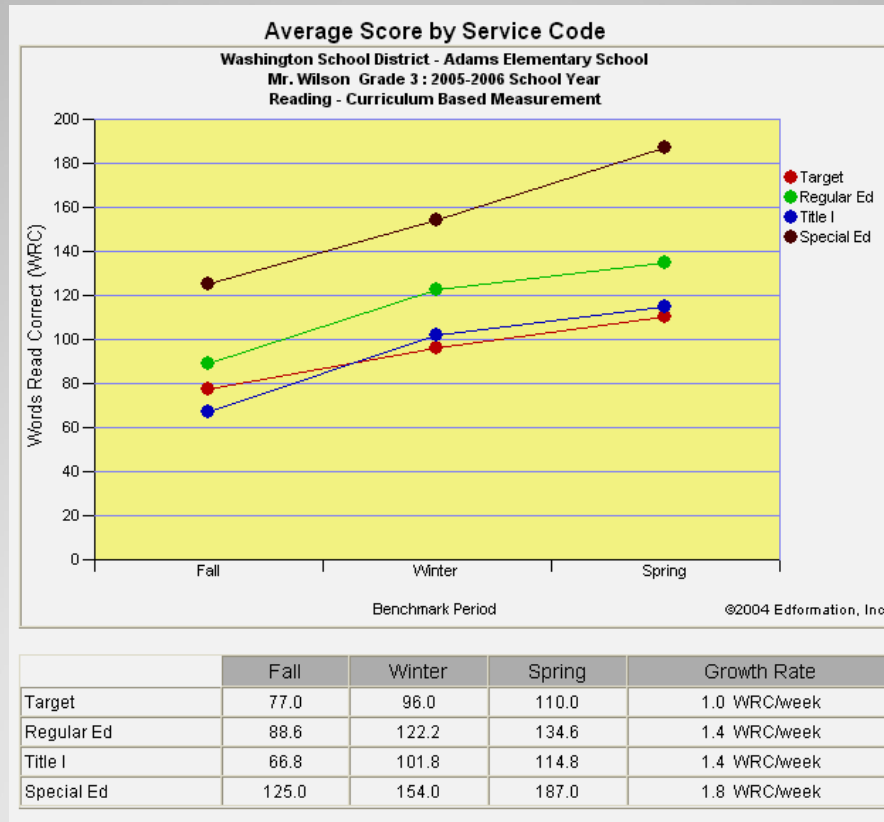
There are multiple ways to determine the criteria:

•Receiver operating characteristic (ROC) Curves

•Percentile Ranks. Example

    – Below 10%tile   =   deficient

    – 10%tile - 25%tile   =   emerging

    – Above 25%tile   =   established

Targets

- Typically based on analysis to determine cut points

- Can be correlated with high stakes testing
  - e.g., students who reach the target have an 80% likelihood of scoring proficient on the state test

Average Score by Service Code

Washington School District - Adams Elementary School
Mr. Wilson Grade 3 : 2005-2006 School Year
Reading - Curriculum Based Measurement

Legend: Target, Regular Ed, Title I, Special Ed

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	Fall	Winter	Spring	Growth Rate
Target	77.0	96.0	110.0	1.0 WRC/week
Regular Ed	88.6	122.2	134.6	1.4 WRC/week
Title I	66.8	101.8	114.8	1.4 WRC/week
Special Ed	125.0	154.0	187.0	1.8 WRC/week

Interpreting CBM: School, Grade, Class, or Student Level Decisions

Levels of Tier 1 Data Analysis

SCHOOL

- Look for general school trends or issues (and then grade level)
- Evaluate effectiveness of school models of curriculum and instruction
- Identify areas of need and set measurable school wide goals
- Offer recommendations to grade level teams

GRADE

- Look for grade level trends or issues
- Evaluate effectiveness of grade level curriculum and instruction
- Identify areas of need and set measurable grade level benchmark goals
- Identify strategies to meet goals
- Develop an action plan
- Identify potential students for Tier II

School Teams:
Looking at the Big Picture

School Comparative Performance : Winter 2007-2008
DIBELS - Oral Reading Fluency
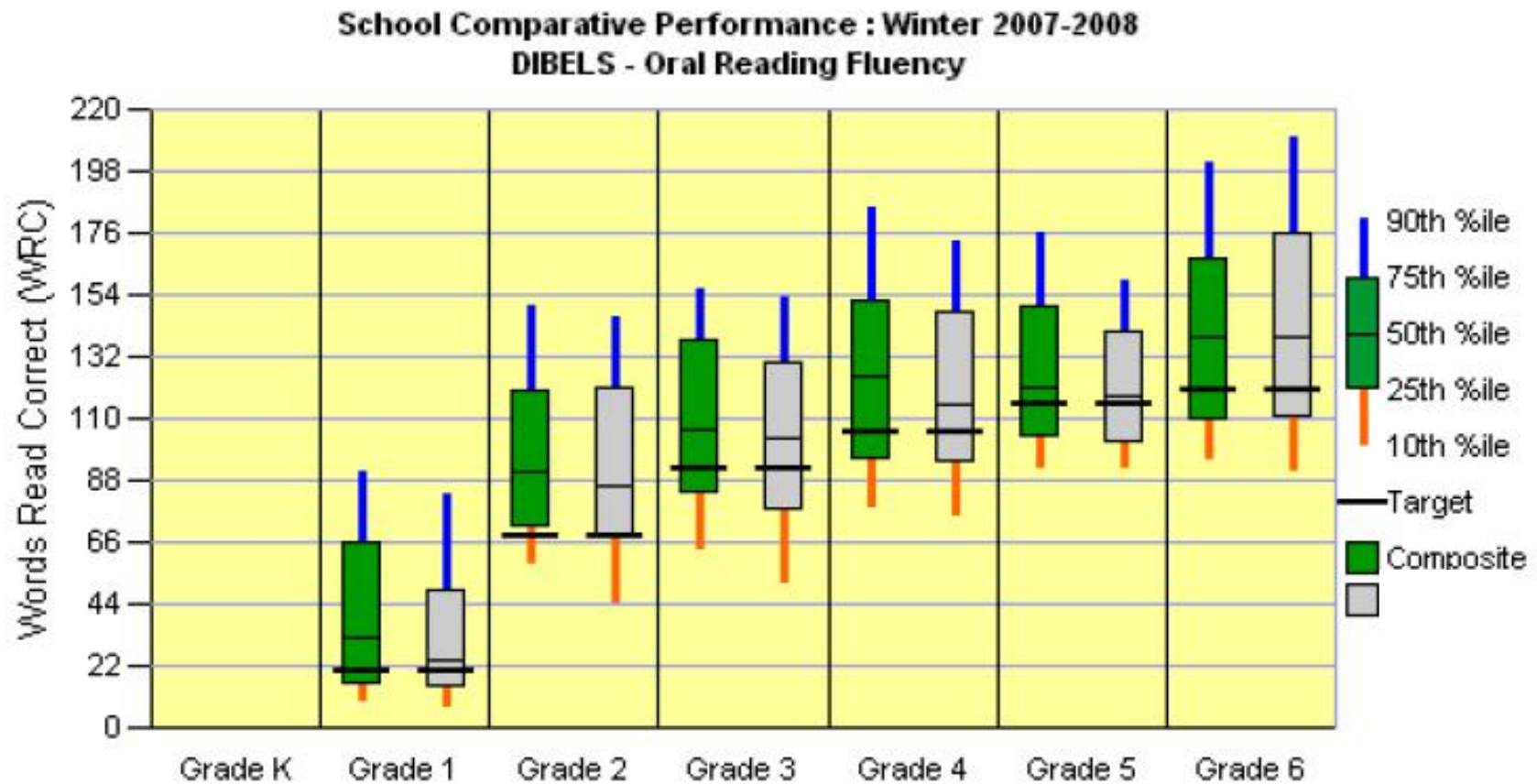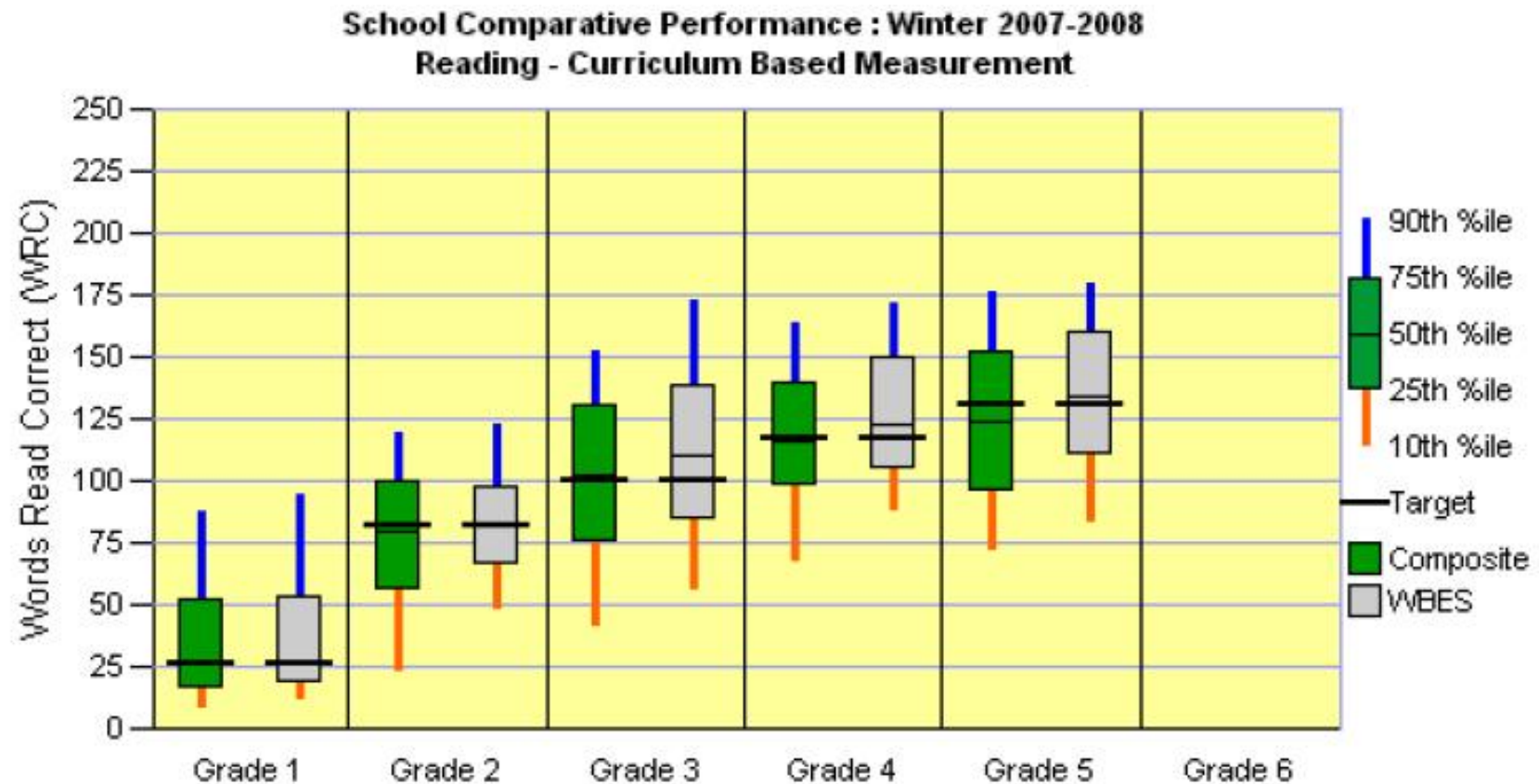
School Example #1

School Teams: General Trends
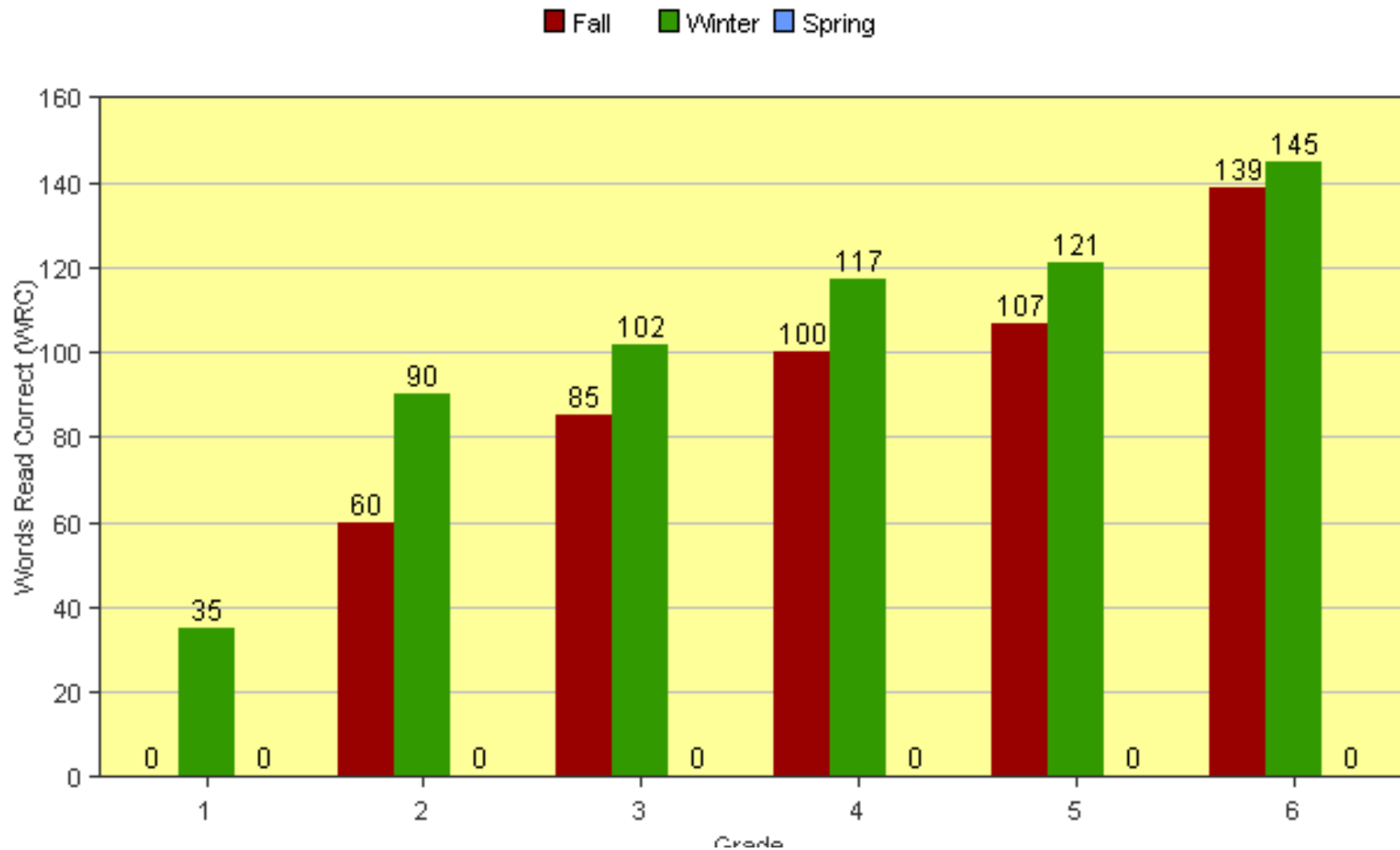
School Example #1

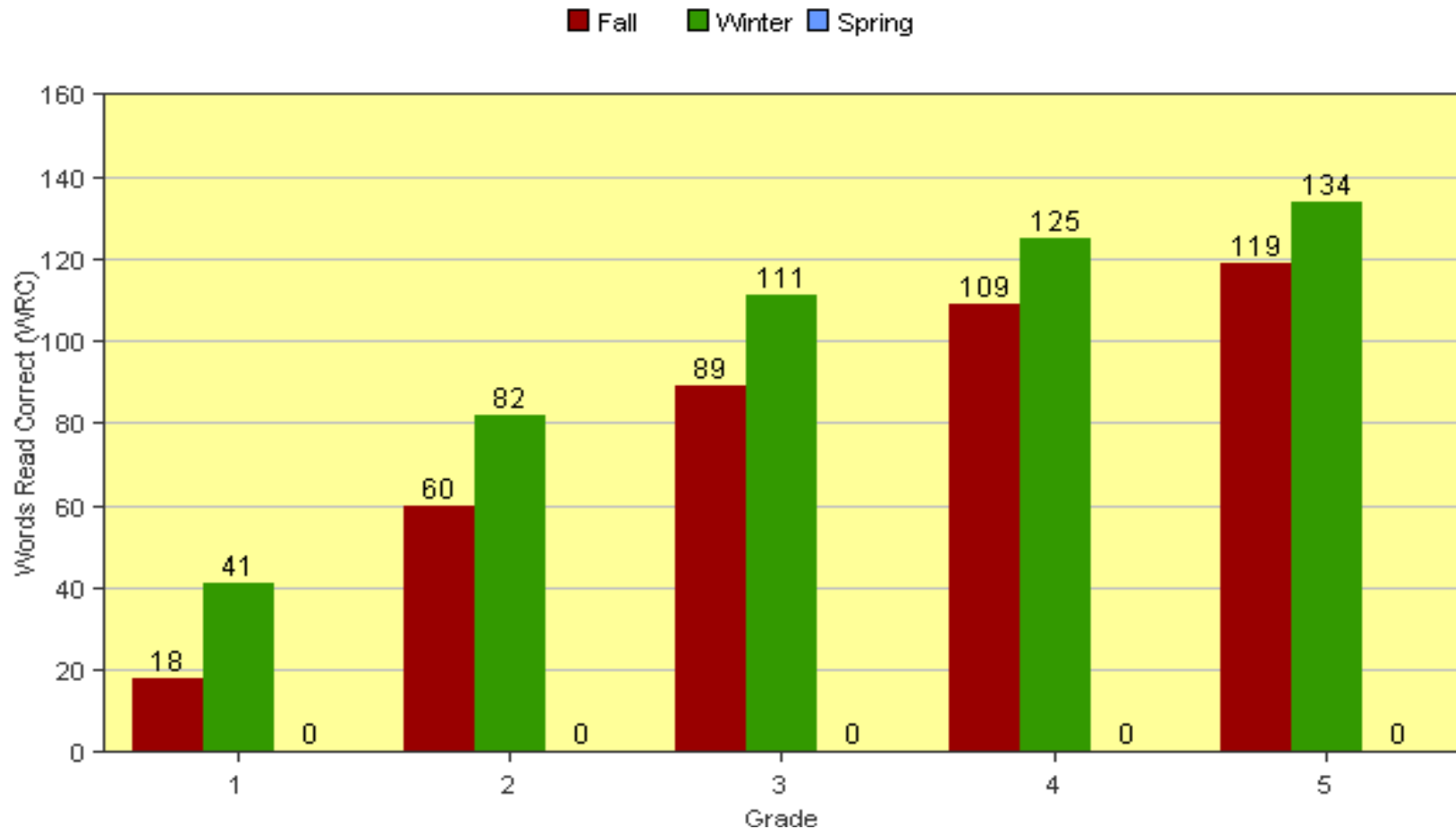# School Teams:
Looking at the Big Picture

- Identify any general trends or issues
  - May include things that look out of place
  - Determine if data valid
- Brainstorm WHY the team may be seeing those trends or issues (good and bad)
  - e.g., curriculum changes, new program, new strategies
- Identify areas of need and set measurable school wide goals
- SHARE with the other school members

School Teams:
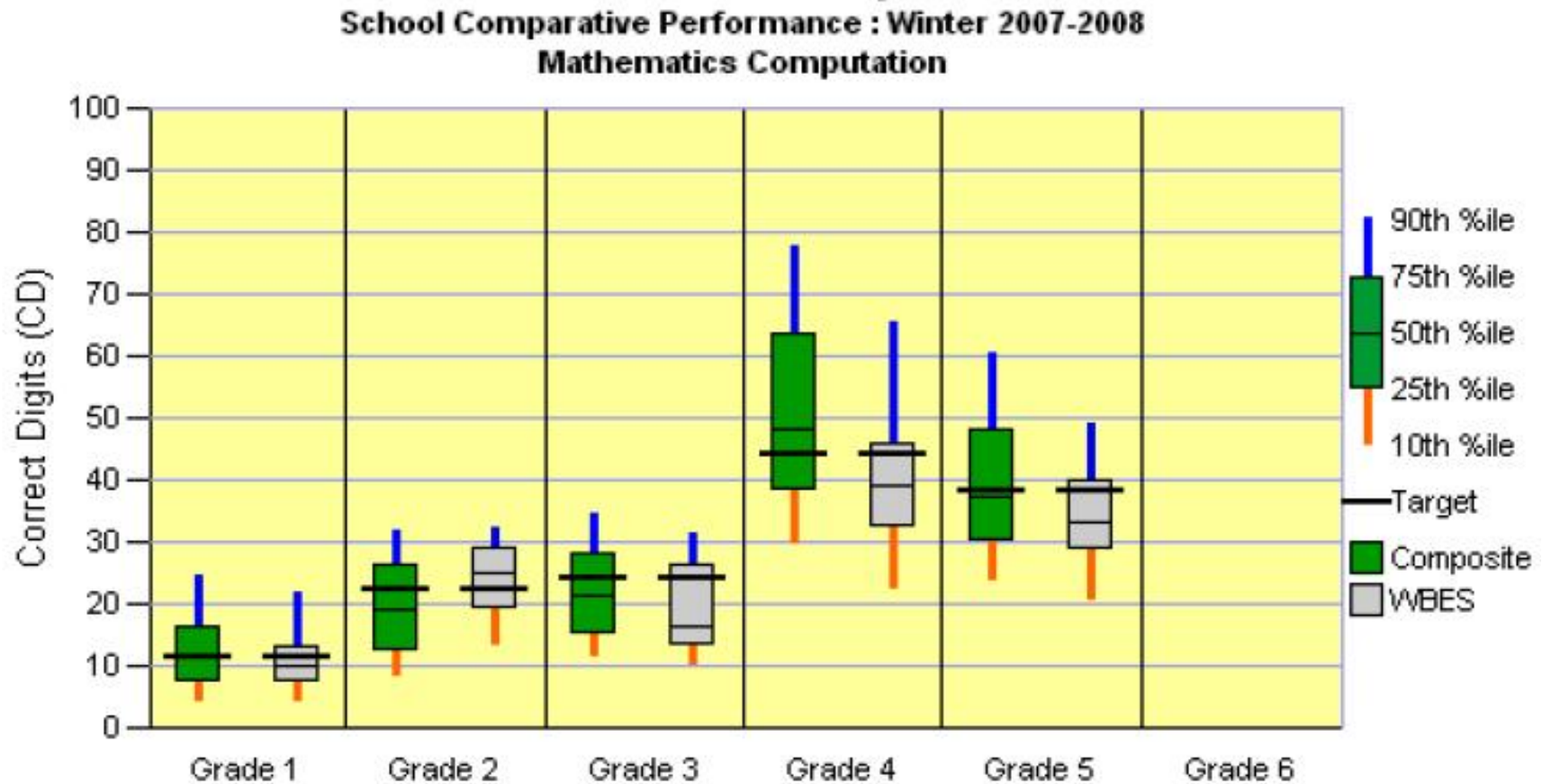# Looking at the Big Picture

School Example #2

School Teams:
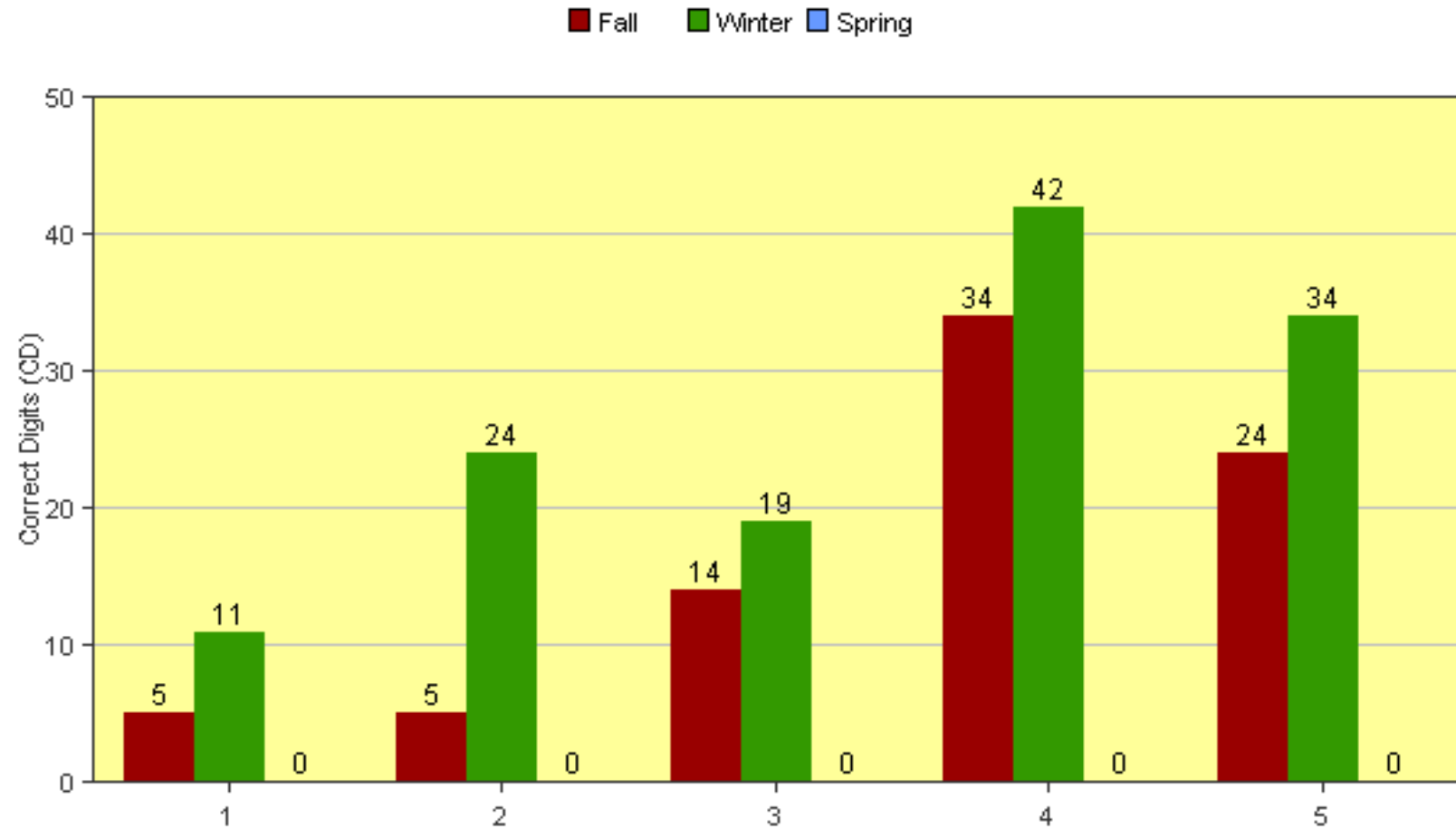# Looking at the Big Picture

School Example #2

School Teams:
Looking at the Big Picture

School Example #3

School Teams:
Looking at the Big Picture

■ Fall   ■ Winter   ■ Spring
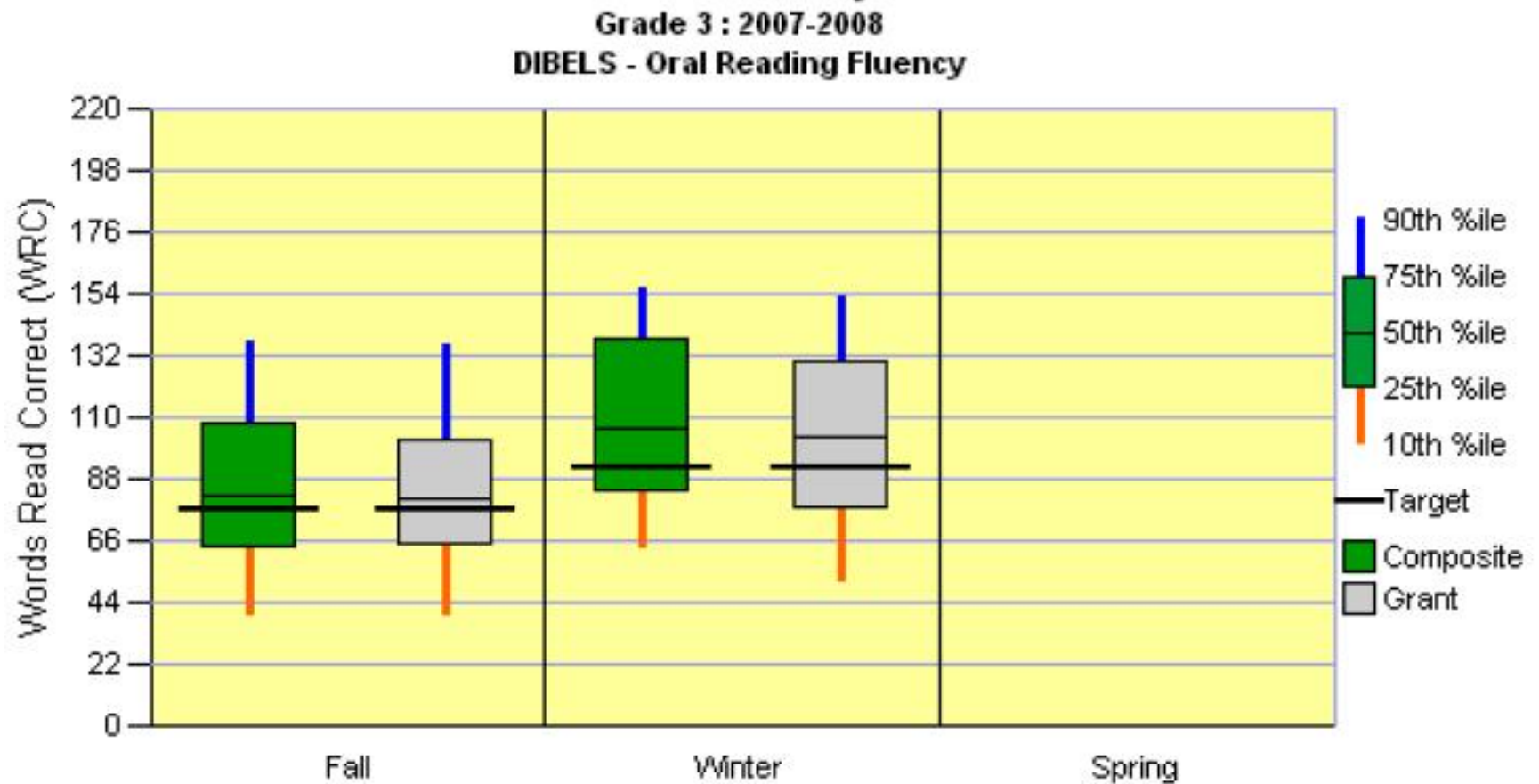

School Example #3
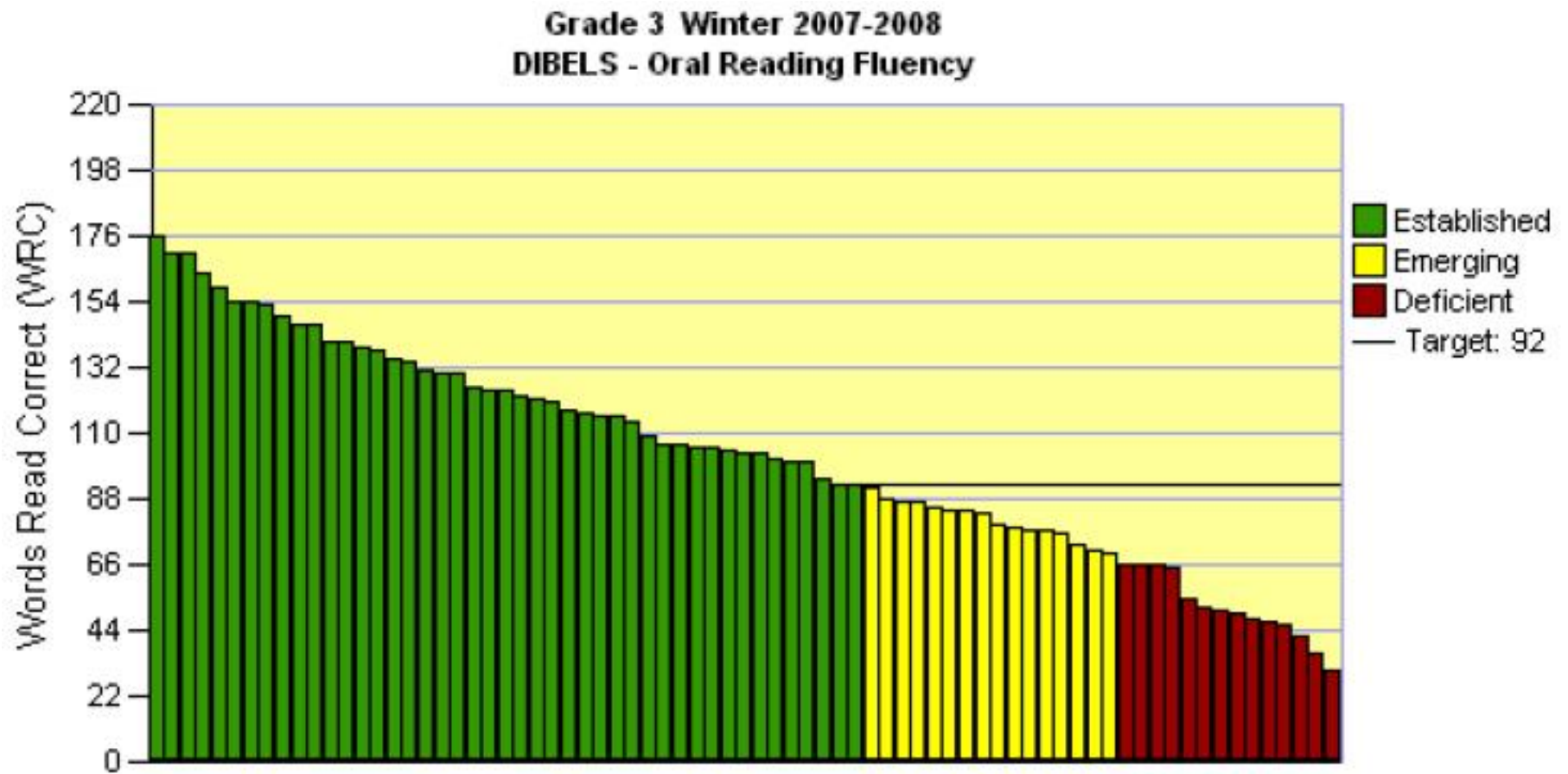
Grade Level Data Analysis

- Focus is on grade level data, NOT individual students

- Data analysis procedures should be efficient, systematic practices

- Must guide and inform instructional decisions
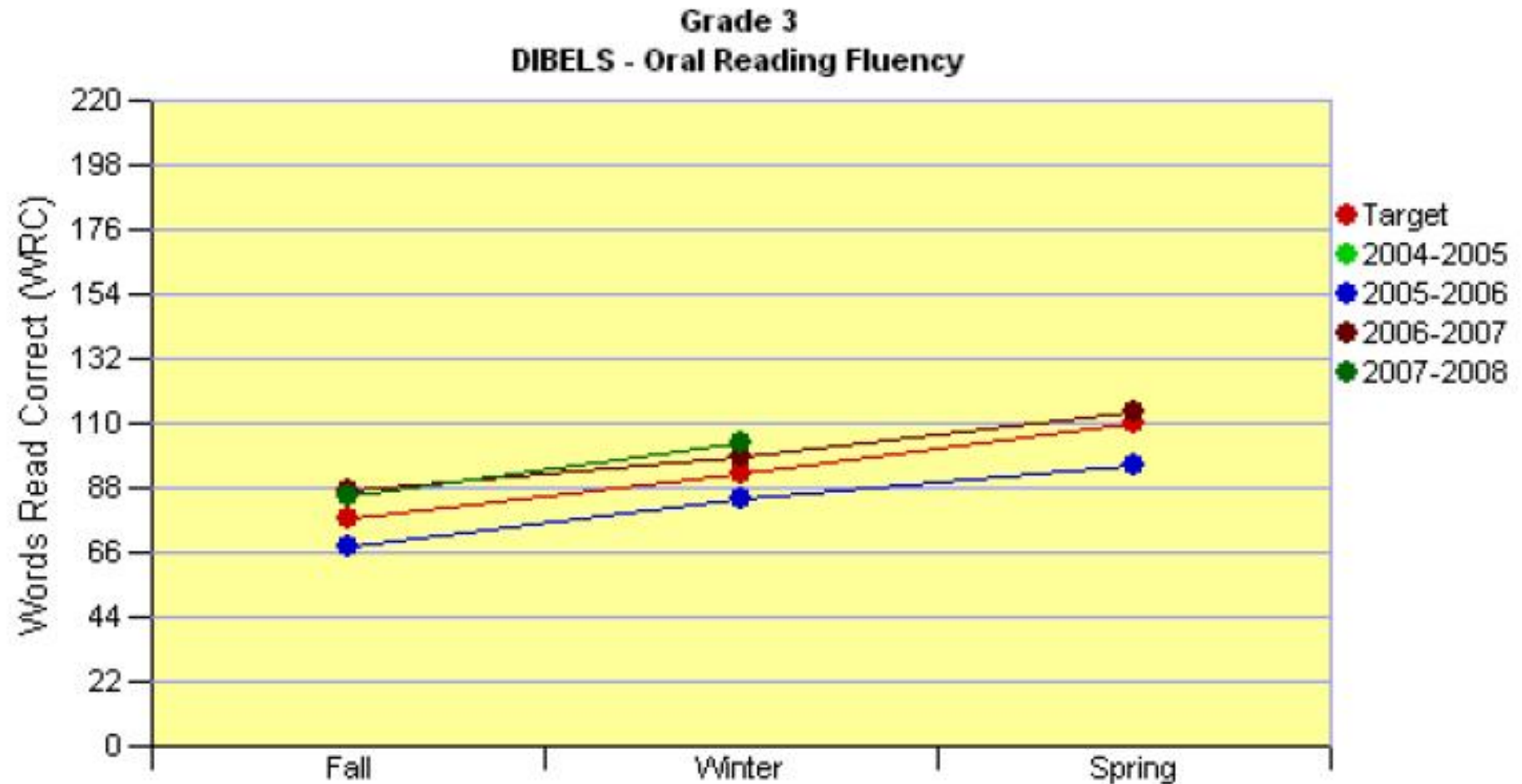
Grade Level Teams: Tier 1

Grade 3 : 2007-2008
DIBELS - Oral Reading Fluency
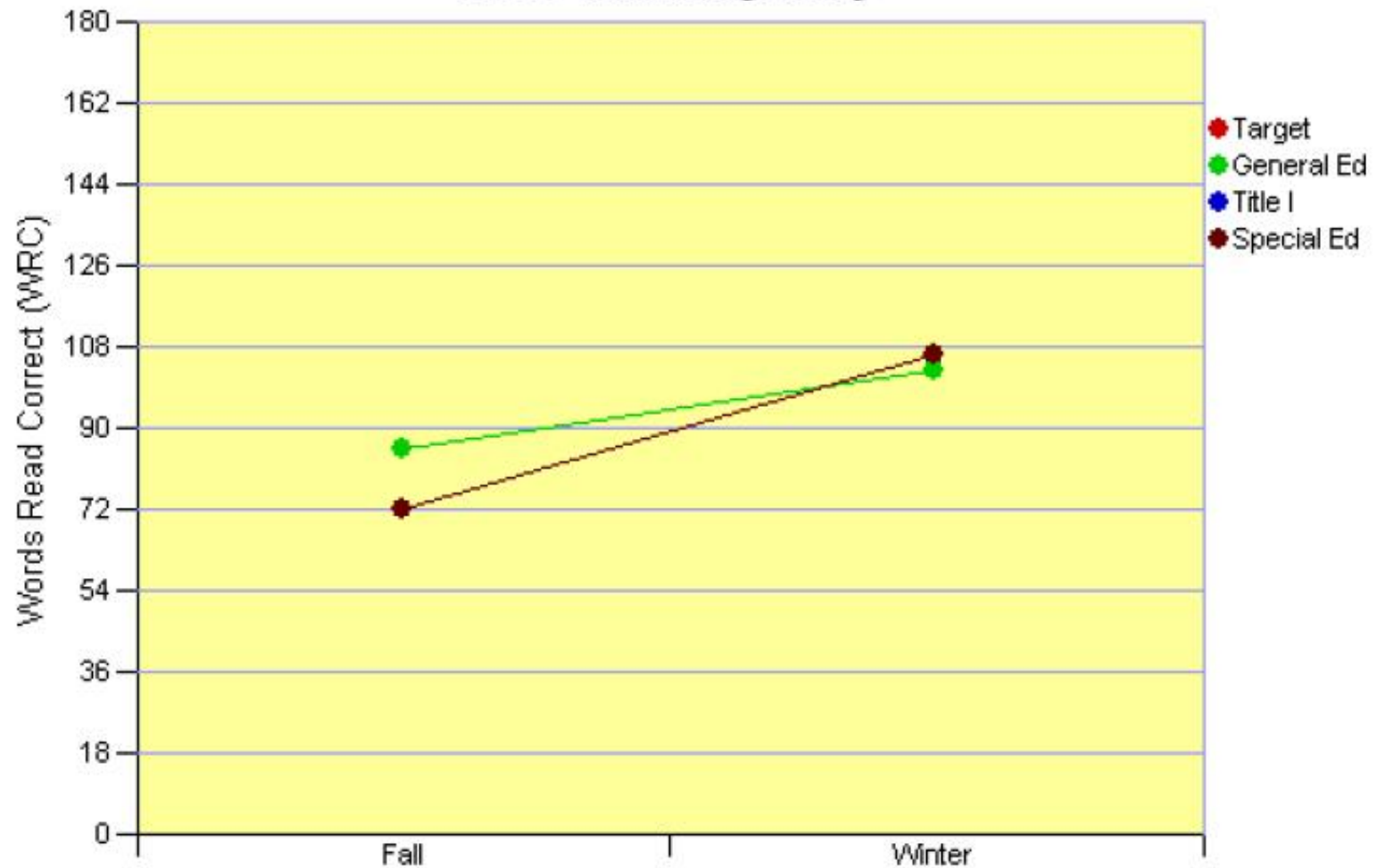
School Example #1

Grade Level Teams: Tier 1

Grade 3 Winter 2007-2008
DIBELS - Oral Reading Fluency

School Example #1

Grade Level Teams: Tier 1

Grade 3
DIBELS - Oral Reading Fluency

School Example #1

Grade 3 : 2007-2008 School Year
DIBELS - Oral Reading Fluency

Benchmark Period

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	Fall	Winter	Growth Rate
Target	N/A	N/A	N/A
General Ed	84.9	102.4	1.0 WRC/week
Title I	N/A	N/A	N/A
Special Ed	72.0	106.0	2.0 WRC/week

Grade Level Data Analysis
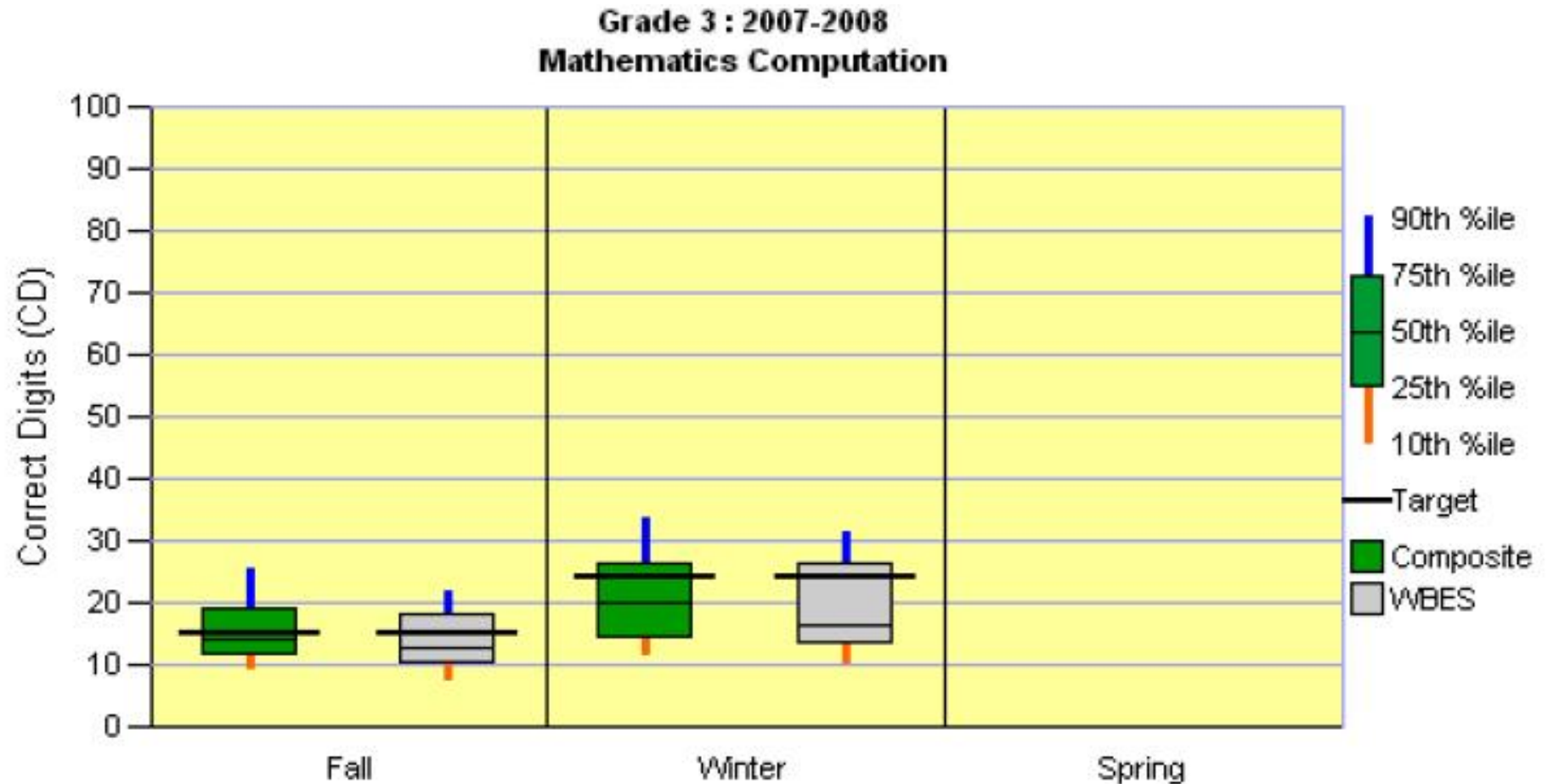
STEP 1: Look for grade level trends or issues

– Determine the percentage of students

– Evaluate effectiveness of grade level curriculum and instruction

STEP 2: Identify and rate areas of need for Tier I Instruction

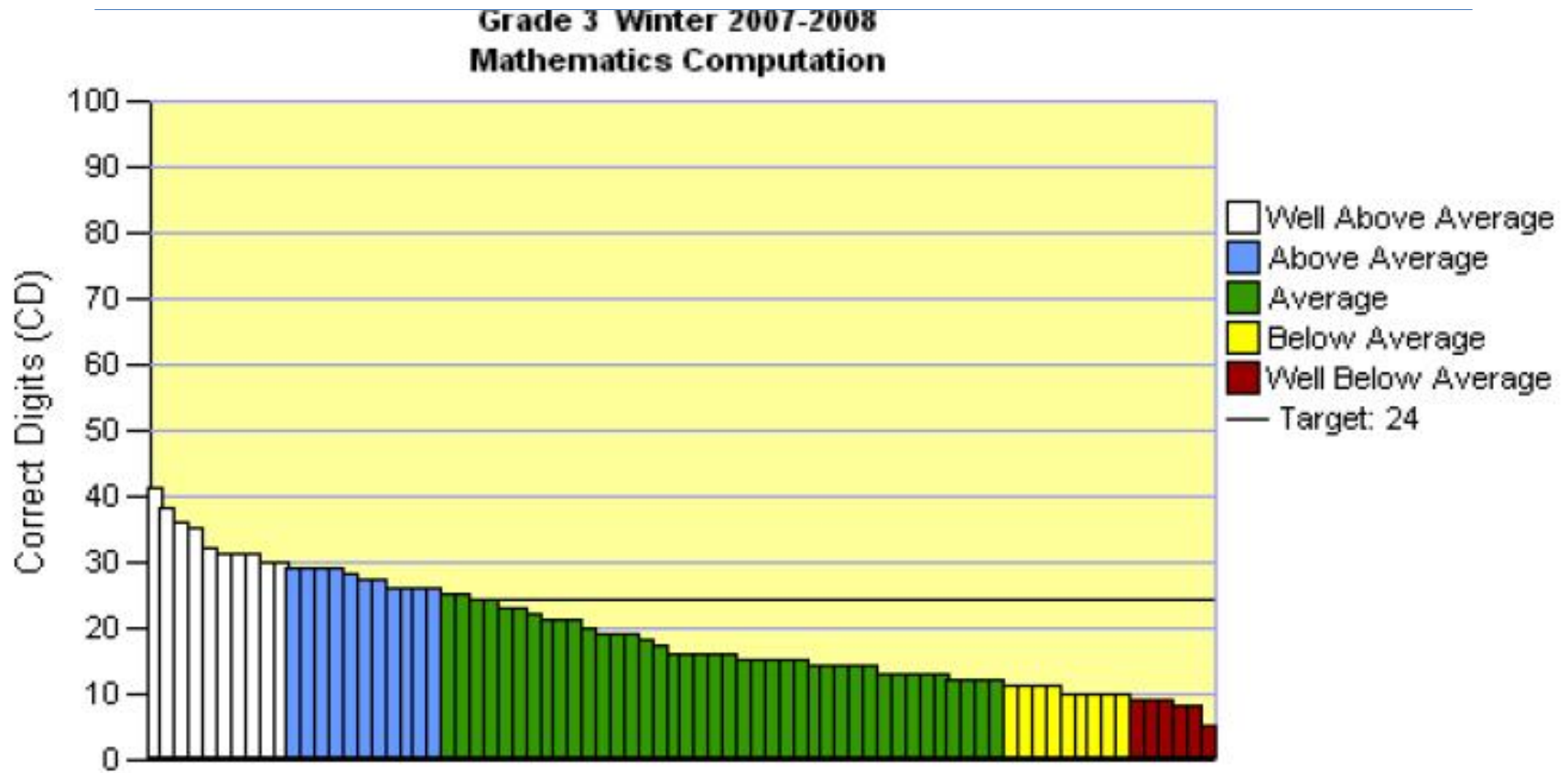STEP 3: Set measurable grade level benchmark goals
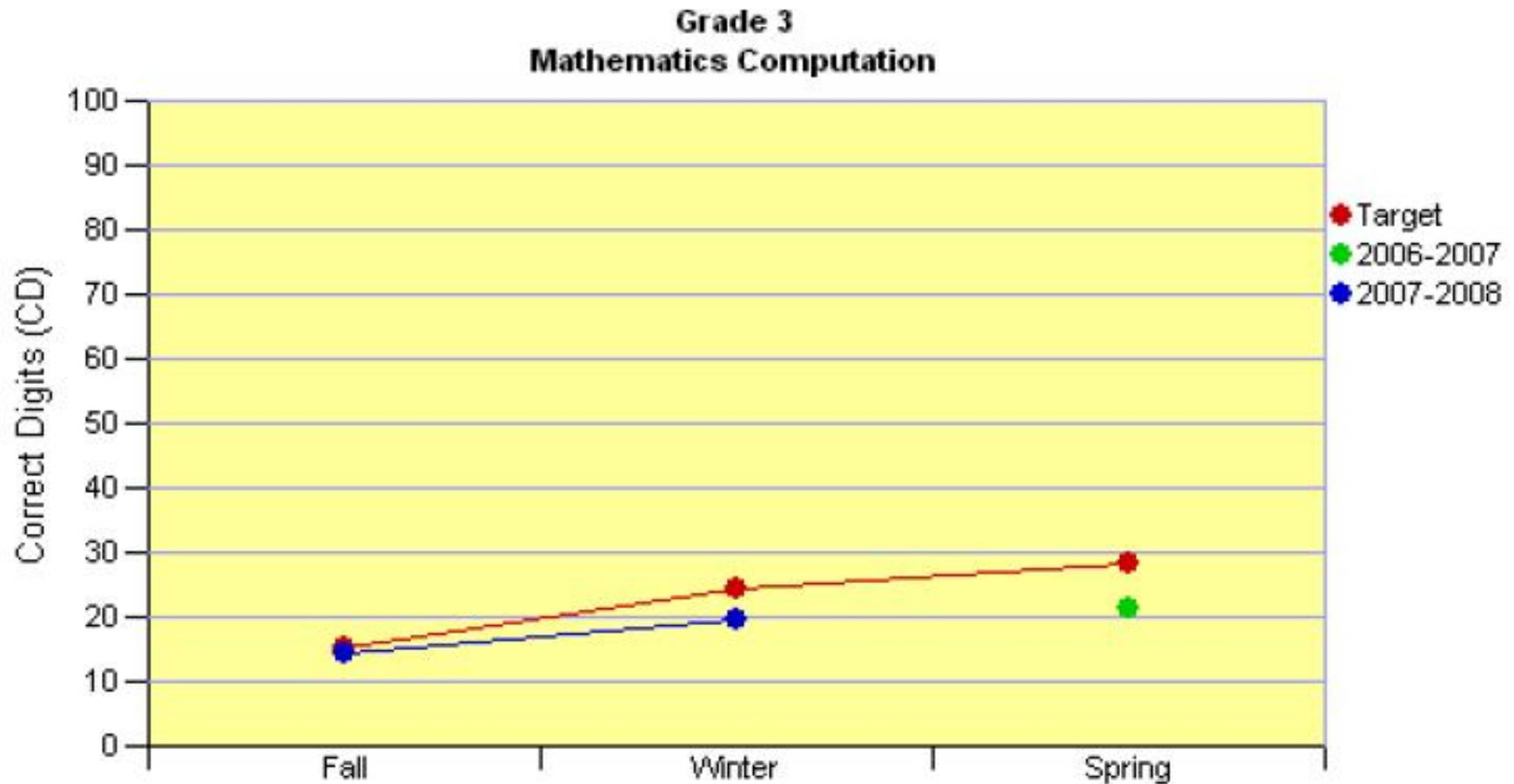
Grade Level Teams: Tier 1

School Example #2

Grade Level Teams: Tier 1

School Example #2

Grade Level Teams: Tier 1

School Example #2

Grade 3 : 2007-2008 School Year
Mathematics Computation
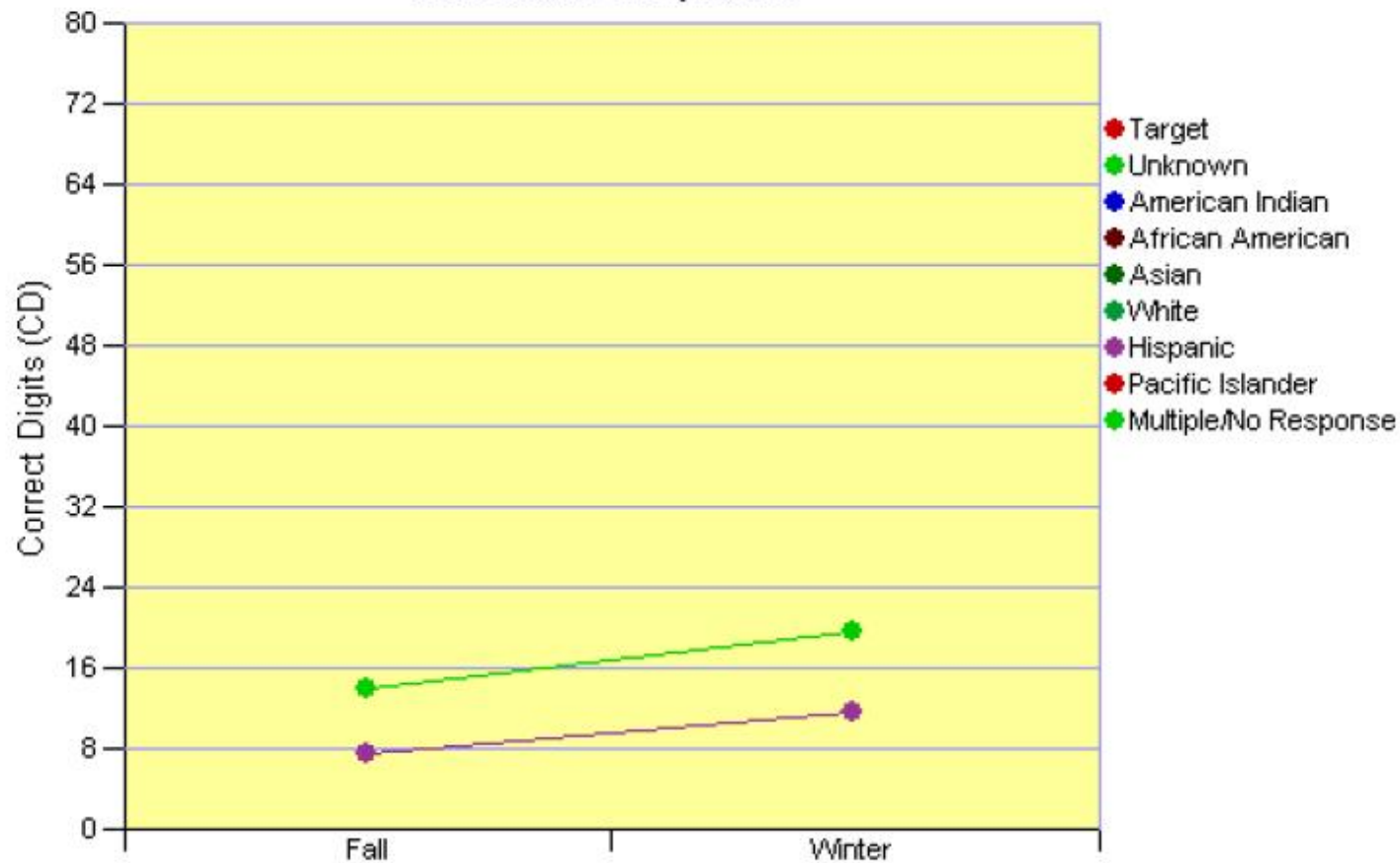
Benchmark Period

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	Fall	Winter	Growth Rate
Target	N/A	N/A	N/A
Unknown	13.9	19.5	0.3 CD/week
American Indian	N/A	N/A	N/A
African American	N/A	N/A	N/A
Asian	N/A	N/A	N/A
White	N/A	N/A	N/A
Hispanic	7.3	11.5	0.2 CD/week

Grade Level Data Analysis

STEP 4: Brainstorm and identify strategies to meet goals

- Should benefit instruction for all or most students
- Should be practical and feasible

STEP 5: Develop plan of action to implement the selected strategies

STEP 6: Identify students who need supplemental instruction (Tier II)

Grade Level Teams: Identifying Tier II Students

Fall of 3rd Grade to Winter of 3rd Grade

Impact of Benchmark Curriculum**				Impact of Strategic Support Program				Impact of Intensive Support Program			
Students at Benchmark at Fall of Year	Fall M-CBM Score	Winter M-CBM Score	Reached Winter Target of 24 *	Students at Strategic at Fall of Year	Fall M-CBM Score	Winter M-CBM Score	Reached Winter Target of 24 *	Students at Intensive at Fall of Year	Fall M-CBM Score	Winter M-CBM Score	Reached Winter Target of 24 *
Altamirano, Serene	19	30	✓	Arreguin, Antonio	16	17		Becker, Gabriel	8	16	
Anderson, McKenna	21	27	✓	Arreguin, Sergio	15	26	✓	Carrillo, Judith	5	10	
Asante, Kwame	21	26	✓	Basurto, Josue	13	15		Chavez, Roger	9	23	
Brokaw, Casey	18	25	✓	Brandt, Noah	17	13		Delgado, Niczely	9	13	
Burger, Zackary	25	29	✓	Burg, Robert	14	15		Gomez, Juan	7	16	
Chavez, Gisel	29	30	✓	Byars, Neena	12	15		Gonzalez, Giselle	5	9	
DeVicente, Isaac	18	36	✓	Calderon, Christian	10	14		Guevara, Jose	6	12	
Garcia, Veronica	21	29	✓	Camacho, Nancy	11	14		Guevara, Melissa	7	32	✓
Goergi, Sophia	19	14		Castaneda, Tanya	10	11		Hernandez, Diana	9	10	
Gonzalez, Eric	22	22		Cuellar, Liliana	11	18		Hernandez, Michael	9	13	
Gonzalez, Jazmin	19	8		Diaz, Oscar	11	21		Martinez, Jennifer	5	10	
Gray, Neimian	23	21		Dumo, Adam Felipe	12	13		Potts, Collin	9	5	
Knight, Devon	21	26	✓	Escalante, Jonathan	14	12		Rivera, Erick	6	11	
Muddiman, Brandon	21	24	✓	Estrada, Ivan	11	20		Simon-Bravo, Isaac	5	15	
Patterson, Rachel	18	21		Garcia, Jorge	12	10		Wells, Imani	7	9	
Perez, Martin	18	27	✓	Guizar, Elva	12	12					
Perez, Zimrry	21	38	✓	Gurske, Cassidy	15	23					
Perez-Martinez, Victor	26	29	✓	Harris, Benjamin	17	28	✓				
Scheumann, Zachary	21	41	✓	Kirk, Harrison	11	14					
Schweer, Kyla Marjorie	22	31	✓	Lopez, Alfredo	12	11					
Average Score:	21	27	Count: 16/21 Percent: 76%	Average Score:	13	17	Count: 8/40 Percent: 20%	Average Score:	7	14	Count: 1/15 Percent: 7%

Things to Remember

- Good data IN… Good data OUT
  - Know where your data came from and the validity of that data
- Focus on the big picture or ALL Students
  - Are most students making progress?
- ALL instructional and curriculum decisions should be based on DATA.
- Keep it <u>Simple</u> and <u>Efficient</u>!

Putting It All Together

- Select Evidence Based CBM Tools (www.rti4success.org)
- Establish Systematic Data Analysis Procedures
- Establish Data Review Teams
- Ensure Accuracy of Implementation

Thank You!

- Complete the evaluation
- Practice, Practice, Practice